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ABSTRACT

A day in Cape York, in the far north east of Australia, can change the life of a modern Australian. In that time, one can see hundreds of examples of rock art that are up to 36,000 years old, sharply contrasting the history of Indigenous people and the immigration of Europeans.One such visit led to a proposed collaboration between the Quinkan Culture Elders and a team of metadata researchers. The researchers proposed a Qualified Dublin Core style catalog to be used to identify and record examples of Quinkan Culture so Elders could at last gain access to information needed to manage the proliferation of unauthorized publications about Quinkan culture, and to "bring back home" cultural representations. In addition, the catalog would allow the Elders to make decisions about publishing their own representations. This paper describes the journey of members of the team developing "Matchbox," a cataloging system, as they have sought a way of using Qualified DC metadata (QDC) to describe, collect, and represent Quinkan Culture. One focus in this paper is how developing a QDC representation has led to questions of cultural definition and, simultaneously, of the use of technologies such as HTML, XML and RDF. (Author)

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Dublin Core: The Base For An Indigenous Culture Environment?

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Abstract

A day in Cape York, in the far north east of Australia, can change the life of a modern Australian. In that time, one can see hundreds of examples of rock art that are up to 36,000 years old, sharply contrasting the history of Indigenous people and the immigration of Europeans.

One such visit led to a proposed collaboration between the Quinkan Culture Elders and a team of metadata researchers. The researchers proposed a Qualified Dublin Core style catalogue to be used to identify and record examples of Quinkan Culture so Elders could at last gain access to information needed to manage the proliferation of unauthorised publications about Quinkan culture, and to 'bring back home' cultural representations. In addition, the catalogue would allow the Elders to make decisions about publishing their own representations.

This paper describes the journey of members of the team developing 'Matchbox', a cataloguing system, as they have sought a way of using Qualified DC metadata (QDC) to describe, collect, and represent Quinkan Culture. Of interest in this paper is how developing a QDC representation has led to questions of cultural definition and, simultaneously, of the use of technologies such as HTML, XML and RDF.

Keywords: Qualified Dublin Core, HTML, XML, RDF, Quinkan Rock Art, culture

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Introduction

A day in Cape York, in the far north east of Australia, can change the life of a modern Australian. In that time, one can see hundreds of examples of rock art that are up to 36,000 years old, sharply contrasting the history of Indigenous people and the immigration of Europeans.

One such visit led to a proposal for collaboration between the Quinkan Culture Elders and a team of metadata researchers [i] . The researchers proposed a Qualified Dublin Core style [ii] catalogue to be used to identify and record examples of Quinkan Culture so Elders could at last gain access to information needed to manage the proliferation of unauthorised publications about Quinkan culture, and to 'bring back home' cultural representations. In addition, the catalogue would allow the Elders to make decisions about publishing their own representations.

In the nearest city (200 miles away), Elders attended a computer workshop and accessed the Web. Most exciting was the viewing of a recent video of some Elders talking about a honey tree. They enjoyed sharing their stories of collecting honey. They decided a multimedia catalogue would make it easy to prompt new stories and explanations without the need to travel far out into the country.

Meanwhile, working with the Dublin Core Metadata Element Set (DC) has been found by the authoritative museum community to lack much of the richness that is valued by curators. CIMI [iii] several years ago energetically investigated the

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possibilities and found it necessary to modify and extend DC. This work was done with early versions of DC, however. Recently, DC has gained from experience and changed so that it may, indeed, now perform more usefully in this role. The Quinkan researchers are investigating this.

This paper describes a journey undertaken in a university office by some researchers through a myriad of disciplines as they have sought, through literature and so far a very few interactions with Indigenous Elders, a way of using Qualified DC metadata (QDC) to describe, collect, and represent Quinkan Culture.

Of interest in this paper is how developing a QDC representation has led to questions of cultural definition. This is not a paper about how Indigenous people have worked on their cultural interests. It is about how the questions being asked by the researchers have changed. In fact, these questions appear as indicators of the change in their understanding. Why such changes are reported here is because they seem to offer a way of thinking about the use of metadata-based technologies to explore the nature of tools that may be useful to those working in cultural contexts.

Context

We held a series of meetings and exploratory visits to the far north east of Australia, where the communities are small and Indigenous people have been involuntarily scattered. We, a small group of European Australians, proposed a project that we hoped would serve as a useful resource for our Indigenous colleagues and help them repatriate their heritage. We are not experts in such matters, with the exception of one of us who is a specialist in the archaeology of the region.

To us novices, it seemed that a catalogue of cultural heritage would make it easier for the Indigenous people to control their heritage. There was a rewarding workshop in which Indigenous Elders showed their pleasure in sharing interpretations of events and objects, and we assumed from this that a catalogue might be a good organising tool and stimulus for gathering such stories.

Naively, perhaps, we thought Quinkan culture would somehow be amenable to being catalogued. It seemed that all that would be required was something like an extension of an archaeological catalogue.

Sadly, there no longer are rock artists, and relevant cultural practices are scarce. Today, Elders tell stories of hunting, of gathering bush tucker, of lives in which they have unfortunately been victims of the invasion of their country. They gather to celebrate their dance culture. They take people to see some of the many Rock Art paintings. There has been carbon dating of some paintings, scores of anthropological, geological, and many other forms of study of the region, and there are data in many forms and locations world-wide.

The government is building an 'interpretive centre' in the region, but what is to happen there is unclear. This 'open' museum may be a collection of tangible and intangible assets, a presentation site, a meeting place. Whatever, it is in its infancy as a cultural institution. One idea is that the Quinkan catalogue will be a living exhibit, an environment, in this small space, and possibly a cultural heritage management tool.

The First Question

Given that the most obvious 'cultural assets' in the region are Rock Art paintings and petroglyphs, our focus naturally gravitated towards these. This is not all there is in the region, of course, but such a vast number in apparently original condition is attractive as a 'collection', a set of objects that can be identified, described, possibly even quantified. It is also interesting to note that these paintings are

fixed; their location is stable and discernible in great detail using modern geo-spatial tools and techniques. At first glance, it might seem that the first question would be how to describe the location of the paintings, and then everything would follow.

Quinkan Rock Art occurs in what have been called galleries, usually open shelters high up on steep overhanging rock outcrops. The areas are appealing because of their aspect, catching the breezes and providing shelter, and frequently also having good views of the surrounding country. Galleries contain as many as hundreds of paintings, often superimposed on one another, with remarkably fresh-looking paintings in abundance. Fortunately, although there are almost no resources available to protect this heritage, it is isolated and has not suffered, as it might, from extensive tourism. Like the flora and fauna of Australia, the Rock Art sites are geologically frail, and human visitations cause significant damage to the sites themselves, as well as to the paintings.

Not all paintings or galleries have been identified and had their location recorded. Some have had minute details recorded about them, while others are known to be sort of 'over there'. But the idea of a stable identification system with descriptions of material culture is attractive, and modern technology offers great precision to the task of recording relevant locations.

So using location with sufficient detail to develop a geo-spatial topology could solve our problems. This is, after all, a typical approach: every resource in our collection could have the location of its content so well specified that it would only need to be differentiated from others that are related to *exactly* the same location. Trouble is, Elders do not want their paintings, or presumably their culture in general, identified in this way. The way we want to describe locations is, a matter of cultural preference, and geo-spatial science is not a traditional way. In Australian Indigenous cultures, land is not just a commodity, and location is not just a number. The sites where paintings are located are the same places where sacred objects and spirits are likely to be found. People and their country, locations as others think of them, are inextricable intertwined. Access is often limited to a few people, and the rules for access are not published.

For non-Indigenous researchers who work on Indigenous cultural heritage in the area, recording and revealing locations has no more interest than for their Indigenous colleagues. The paintings are in remote country, perhaps several days' walking time from the nearest accessible track, and that might be several days' driving from the nearest town. Small helicopters can sometimes land directly near sites. But site visitation is always at a cost, and sadly, it is the condition of the paintings that suffers most when dust is disturbed by visitors and abrasion wears out yet more of the precious images, or when ancient meeting places are disturbed.

What if we were dealing with a Rock Art painting, a chart, a photograph, a scanned image, etc and all were at exactly the same place? The geo-spatial information would not be sufficient to distinguish among the objects just listed. The differences among the objects would be of form, perhaps ownership, possibly content as viewed by different people, and more. Recording these differences, or identifiers, is the primary work of the Dublin Core Metadata Element Set (DCMES). Every object described by DCMES has a unique resource identifier (a URI) and a range of other identifiers.

Seeking Answers to the First Question

So the first question was: how should the objects to be catalogued be described using a DC-based system?

Starting in what seemed the obvious place, the team consulted the resident archaeologist who, as an archaeologist, has focused on particular examples of material culture, paintings.

Typical archaeological work describes in detail some aspects of the paintings and has at times depended upon descriptive vocabularies that allow for classification of aspects of paintings. A good example is the use of colour classifications that allow archaeologists to make comparisons of the colouring of paintings. Given that all the paintings are in the open air, the time of day makes a significant difference to their appearance. Observations of colour need to be time-stamped and seasonally-marked as part of their codification if they are to be useful. The development of useful colour classifications has therefore been of interest to archaeologists, and there are specialised and idiosyncratic classification schemata.

So to classify all the Rock Art paintings by colour should be a relatively objective activity, and there are established criteria. The same is true of other aspects of the paintings: the date, the location, the shapes of the objects within the paintings, even photographs of the paintings, drawings of them, stories about them, everything could be described. Not all the items would be paintings, of course. In fact, we anticipate stories about paintings and stories about those stories, something like annotations of interpretations or descriptions. But still these objects can be described. Each one is a unique object and with a good description, can be identified.

The information scientist in the team is versed in metadata and had no trouble building a metadata profile that provided for elements and sub-elements, with controlled vocabularies, specialised formats, etc. This work made good sense and could be neatly represented in a hypertext Web page with pull-down menus and active buttons.

The 'describing process' was reduced to the filling in of a form. The description would be more or less useful depending upon how well the elements and qualifications of them were chosen. The metadata application profile (MAP) for each item in the catalogue had be developed in the light of experience over many years, even centuries, on the part of museums, libraries, scholars and others.

Describing objects in this way has been, for a long 'Web' time, the primary use of metadata, particularly of Dublin Core (DC) metadata. Finding the criteria that make it possible to distinguish an object from all other objects with which it might be confused is a primary role for a metadata profile. If a system can use the description of each item in an appropriate way, it will have a handle by which it can perform functions and provide services, such as discovery.

A good example is provided by a resource that is a photograph. If the description is complete, it will be clear not only who and what are in the photograph, the 'aboutness' of the photograph. It will also be discernible which version of the photograph it is, where it is, and so on, and the photograph will be distinguishable from another that looks similar but is, in fact, a second print from the same negative.

We have come to think of this as a first dimensional activity. Unless an item can be uniquely identified, nothing more is possible, so its description is the crucial first requirement, its DNA. The description that we produce for items in Matchbox can be represented completely in Hypertext Markup Language (HTML [iv]). It is capable of being written in plain text with tags to show what each bit means, and it can easily be read and understood by humans. Significantly, the tags can be read by machines so they too can tell what bit goes where. The meaning of what is between the tags, the content that is added to the MAP, is, of course, opaque to the machines.

The First Question Leads to the First Dimension

So working on the first question leads to a set of textual statements that are meaningful to humans and computers and can isolate a chosen object from others.

First dimension mapping (filling in of a MAP) is primarily for discovery. It can also be used to do simple things like pointing to links between objects. In other words, first dimension maps can be used in a first dimension way, for discovery, because they can be used for matching and thus for filtering, and so they can support discovery.

An object might have the special DC tag that contains information about how one object relates to another. Suppose this digitised photograph is of a painting that records a visitor in a gallery that contains a Rock Art painting. The digitised photograph can be linked syntactically (by a machine) to the photograph of the painting if both objects are registered in the same catalogue: the digitised photograph will have the relationship 'is format of' to the photograph. Significantly, the relationship is between one object and another; for instance, a digital file and the photograph that was scanned. There is no machine-readable mechanism for recording the semantic link between the photographs. That is, that the two photographs and the chart are all of the same Rock Art painting is not machine accessible information. The relationship of the semantics, or content, is not expressed in HTML although by filtering the HTML an application could get access to information to make this link. (The important thing to note is that HTML does not convey the link. It is not a part of the description of the photograph, but rather a connection that has to be made somehow.)

It is critical that the object's description contain the necessary information and that the information be in good form and understandable, with ways of deciphering it where necessary, such as dependence on a documented controlled vocabulary. It is not critical, however, that the information be in a simple form such as the proposed HTML version (referred to above). It may be in a more complex form, expressed in eXtensible Markup Language (XML [v]) or even using the Resource Description Framework (RDF [vi]). Where this is the case, there is generally also a human-readable version made available by the system responsible for the representation because, although the text content is within the XML or RDF, it is surrounded by a lot of other syntactical clutter that may make reading it difficult. The form of expression is not important for its first dimensional use, for discovery that is based on unique identification, for example. Whether the additional information contained in the XML or RDF format is a problem or not depends upon the system using it.

The Second Question

The second question relates to how the semantics of the descriptions can be made to carry information about the structure of the descriptions. How can it be made known to a machine that this object is a scanned version of that object? It turns out that finding a way to represent structure is the next problem.

If I am looking for something and do not know its DNA, or MAP values, I may want to 'browse' through what is available until I find something that will do for me. This is the typical position of many users of Web navigation; they know they want something but either have not spent the time or do not know how to frame a discovery question that will guide them to a satisfactory object (containing the required information). This user is doing something quite different from those who know exactly what objects they are looking for - the user in this case is usually looking for information about something but not sure what form that information will take (and maybe does not care anyway). The mapping that will provide this user with what is wanted will have to be used somehow to link objects in some hierarchy that will lead the user towards material satisfactory for the purpose. In fact, often the user likes to vary the discovery process and tries at times to narrow the field with a search during the browse, but inasmuch as he or she is using a browse navigation system, the object's description MAP will be essential. It will be used to show that this is a scanned version of that, for instance, because the two objects will be identified as having a relationship to different parts of a single hierarchy of production of digitised images.

Question Two Works to the Second Dimension

In the Matchbox case, it is not clear how users will want to browse, or, more correctly perhaps, what they will expect to find as the underlying structure of a browsing activity. Users do not always see the structure, but it is important that they learn to 'drive' it, and this usually comes from the effective development of a structural representation in the users' minds. Users do not like suddenly being jumped to a resource or set of resources that do not have what appears to them as a logical connection with what they thought they were asking for, or the resources they thought they were already viewing.

Some Matchbox users do act in predictable ways: those who work within established disciplines usually have learned to respond to the disciplinary taxonomies and terminology and can make fairly accurate guesses about what will happen if they are browsing up or down a hierarchy of criteria. It is also fairly predictable what type of criteria they will use: title, format, aboutness, authorship, etc., in many cases.

The Dublin Core Metadata Application Profile captures this information well. Once there is more specificity, qualifications to the DCMES can focus the mind appropriately, especially if there are additional elements that are useful in the context (for instance, the CIMI profile for museums). But in order to be machine readable, this structure must be declared in syntax that makes it accessible to machines. So the team has to express its qualified, extended Dublin Core-based metadata application profile for Matchbox in a way that will convey the relationships. XML, as recommended for the DCMES, makes it possible to declare both the relationships and the data.

The photograph of the person referred to above might contain information such as that the person 'is the child of xx' and 'is the parent of yy'. This is interesting but not readable information if it is expressed in HTML: the semantics are opaque. But if the semantics are expressed in a machine-readable way, the photograph, upon inclusion in the collection, can be linked by a set structure such as a family tree to pictures of the parent and child if they are in the collection.

Ideally, where elements are found useful and derived from established metadata application profiles, it should be easy and most accurate to simply import them into a new, combined, in this case Quinkan, profile. eXtensible Markup Language (XML) makes this possible, so instead of recording the maps of resources in HTML, it becomes necessary to record them in XML so their structures will also be recorded and thus decipherable.

XML is such a versatile language that many people can be using compliant, valid XML, and recording the structure of their information about their resources, and not be constrained by having to use the same way of representing their information. If MAPs from different sources are to be combined, however, there will be a problem with also conveying the structure that is associated with those MAPs. XML does not provide an easy way to solve this as the structure needs to be declared in advance, and it may be broken by the process of combining bits and pieces. In other words, the structure and the information are so closely coupled in XML that there is a risk the coupling will be broken when the XML is fragmented.

In the Matchbox case, this means recombining the pieces of others' MAPs with the new, special Quinkan pieces, to work in an integrated structure to be provided by the team. This structure, or taxonomy as we refer to it, will determine the browse structure. In fact, we may provide more than one to suit more than one group of predictable users. Some taxonomies, particularly those that are established elsewhere as useful to disciplined users (archaeologists, anthropologists, etc.), have already been identified and will be used to organise the semantic content of the resource maps, but they will need to be augmented by more general user-oriented taxonomies.

Just as HTML was closely related to the opening up of the first dimension of discovery, eXtensible Markup language that provides structure has made possible the second level. Without a structured description, there is not the

control required. But once in XML, it does not matter if there is more structure than is necessary. For instance, if the mark-up complies with the Resource Description Framework (RDF), it is XML and useful at both the first and second level but may have added advantages.

Pre-determining the structure of the resources unfortunately does not work well in the Matchbox context. Our major challenge is not to find how to catalogue resources so that those who work within well-defined disciplines can find them, but to extend the opportunities for use of the resources and particularly to find ways of making them useful to the Traditional Owners of the Rock Art. We had no idea how such people would want to classify information about their heritage.

So we moved to question three.

Question Three

As soon as we asked how the resources should be organized, we found ourselves asking what they would be used for. If Matchbox is a cultural heritage tool, it should do things for its users. The problem is, we don't know what they will want to do.

Perhaps users will just want to find a resource or find if a resource exists. Perhaps they will want to know how it came to be in the form it is in. But what if they want to do with resources something like they do everyday: i.e., use resources in a cultural practice?

It is a well-known activity to try to find a link through friends of friends from one person to another: 'I know Mary and she knows Tom'. 'I am the daughter of Fred and he is the son of Mabel, so Mabel is my grandmother.' These are examples of the sort of relationships that people make between information, of cultural practices.

Australian Indigenous people often have long histories of their family in their memory, and they can relate these to people with whom they are interacting. They also have kinship structures that are different from the standard atomic family groupings that characterise modern western society. Linking people in photographs in some ways associated with indigenous kinship structures might prove to be of interest to Matchbox users in the future. So far, such structures are not defined for use in Matchbox, but they may be in the near future.

The Third Dimension

A simple example follows. It is not something that the Indigenous people have said they want to d,o but it is proposed as typical of something that might be of interest, so it can be presented to them.

Libby Miller and colleagues have developed Co-Depiction [vii] , an RDF system that takes a photograph, with the e-mail addresses of those in the picture, and uses this information to map from one person in that picture to a person in another picture by working on the friends-of-a-friend principle. If I am in a photo with Mary and Mary is in a photo with Jack, then two photos can be used to automatically link me to Jack.

In the Matchbox example, the idea is that as Indigenous people often use their genealogy to identify themselves, it might be interesting to use a yet further constrained friend of a friend principle to link photographs as they are placed in a collection. This could be achieved by having a structure, as described before, and having the new photograph deliberately located in relationship to that structure, each photo being described as containing an image of a person in a particular position in a family tree. But suppose we don't know the structure or family-tree equivalent when we start collecting the photographs? Suppose that the families are intermingled in ways that are not usually documented in western

family trees? Suppose the kinship structure requires quite different sorts of connections to be made? All of these suppositions are probably not far from the truth. So we need a way of dynamically associating people and letting the structure emerge. We cannot be tied to a pre-determined structure.

Describing resources in the way prescribed by RDF leaves open the opportunities we need. If we say of any resource, *only something that can be said in the 'triple' format of this resource (x) has this property (y) with this value (z)*, then we can make associations as the photos are added to the collection. Instead of prescribing the associations, we are choosing to leave them open but at the same time provide enough structure for them to have the potential to be used. We provide the simple triple structure in the place of a predetermined more complex structure, and let that be defined later on.

Conclusion

At last we feel we are beginning to address the requirements at the level at which they make some sense in our context. Matchbox needs to use RDF because it is a requirement for the sort of 'doing' that a cultural heritage tool can offer its users. We cannot predict what our users will want to do, and we certainly realise now that we will not be satisfied if all we offer them is a catalogue for discovery by search, or even by browsing. We want to offer a cultural heritage tool, something that does things for them, or with which they can do things. We are aware that we will have to provide some means of accessing the power we provide, but the interface issue is not of concern here.

This paper has worked through three levels of questions that have emerged for the research team associated with the Quinkan Matchbox project. The questions parallel the freedoms offered by the advances in the relevant technologies.

Endnotes and References

[i] http://www.jcu.edu.au/rockart/Matchbox

[ii] http://dublincore.org/

[iii] http://www.cimi.org/

[iv] http://www.w3.org/MarkUp/

[v] http://www.w3.org/XML/

[vi] http://www.w3.org/RDF/

[vii] http://swordfish.rdfweb.org/discovery/2001/08/codepict/

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